Jelena Ž. Maksimović[1],
Jelena S. Osmanović Zajić
University of Niš, Faculty of Philosophy, Niš, Serbia

Veljko R. Banđur
University of Belgrade, Teacher Education Faculty, Belgrade, Serbia

Self-Assessment of Teachers' Ability to Apply Educational Computer Software in Educational Practice

Extended summary

Computer assisted teaching represents a particular teaching method whose goal is not to provide students with ready-made knowledge, but rather to apply an innovative and multimedia approach to teaching that incites all important cognitive processes. This requires that teachers be versed in all the aspects of digital teaching, which means that it is important to study teachers' self-reflection regarding their digital competences. The presented research focused on digital competences related to teachers' self-reflection on their information and digital competences, advantages of the educational software, its application in teaching and the evaluation of the use of digital technology in education. The Factor analysis was used to extract four factors that explained 53.19% of the variance: Digital competences, Advantages of the educational software (ES), Educational software (ES) as a teaching tool and Practical application. The five-level Likert scale was designed for the purposes of the research – Educational software and teachers' competences for its application (ESTC). The scale contained 35 items, arranged evenly in five sub scales in accordance with the established research tasks. The teachers who participated in the research were asked to complete the questionnaire by selecting one of the replies corresponding to the level of their agreement with the presented statements. The KMO value of the test was 0.635, while the Bartlett's test displayed a statistically significant value (p=0.0001), which justified the use of the Factor analysis that was further applied for the statistical data processing. Simple random sampling was selected on purpose. The sample comprised five-

1   jelena.maksimovic@filfak.ni.ac.rs

hundred teachers from central and south Serbia. Regarding the gender, 220 respondents (44%) were males and 280 participants (56%) were females, which proves that the teaching profession attracts more women than men. 216 respondents (43,2%) were primary school teachers, and 284 (56,8%) were secondary school teachers. Considering the years of teaching experience, 118 (23,6%) teachers had 0 to 10 years of teaching experience, 234 (46,8%) had 11 to 20 years of experience and 148 (29,6%) had the teaching experience longer than 20 years. This shows that almost half of the sample was comprised of the teachers with 11 to 20 years of teaching experience. The research was conducted in late August and early September, 2020. Due to the corona virus pandemic (COVID-19), the research was conducted in two ways: digitally, by means of the Google questionnaire and in the field, respecting all prescribed precaution measures. The research proved a statistically significant difference in the respondents' answers with regard to the independent variables: gender, school and teaching experience ($p < 0.05$). A methodical examination of the factors obtained by the application of the Factor analysis and of the respondents' replies proves that teachers are trained to use the educational software in teaching and that they evaluate its characteristics positively.

As regards teachers' digital competences, the research showed that the male teachers and the teachers with 0 to 10 years of teaching experience were most willing to evaluate their own information knowledge, skills and competences. On the other hand, the female respondents, primary school teachers and those with 11 to 20 years of teaching experience were better at recognising the advantages of using the educational software in teaching. Finally, the research results showed that the secondary school teachers and those with 11 to 20 years of teaching experience were dominant in using information and communication technology, digital media and technical tools in teaching, which is a very significant finding relevant for the education in our schools.

This research aimed to present the problems related to the application of the educational software in teaching. The theory can be implemented into practice not only by learning about multimedia tools, but also by taking into account the self-reflection and perceptions of those who are expected to create the multimedia society of knowledge. The implications of the conducted research are reflected in further popularisation of this educational phenomenon, providing conditions necessary for the introduction of the educational software in schools and instructing and training teachers for its proper application. The educational softwares, which are extremely important for a general digitalisation of education, have to be promoted, while teachers should be motivated to attend training in acquiring digital technologies. This will contribute to a further improvement of their digital competences, as well as to the advancement of teaching, education, pedagogy and modern society as a whole.

Keywords: educational computer software, teaching process, teacher, innovation, digital competencies

References

- Barbarić Pardanjac, M., Karuović, D. & Eleven, E. (2018). The Interactive Whiteboard and Educational Software as an Addition to the Teaching Process. *Tehnički vjesnik*, 25 (1), 255–262.

- Berger, T. & Fray, C. B. (2016). *Digitalization, jobs, and convergence in Europe: Strategies for closing the skills gap*. Oxford: Oxford Martin School.

- Bjekić, M., Stanković, N. (2006). Informatička pismenost nastavnika tehnike. U: Golubović, D. (ur.). *Zbornik radova TIO '06* (494–500). Tehnički fakultet: Čačak.

- Blažič, M. (2007). *Obrazovna tehnologija*. Vranje: Učiteljski fakultet u Vranju.

- Bogdanović, M. (2012). Učenje i savremena informaciono-komunikaciona tehnologija. *Godišnjak Srpske akademije obrazovanja*, 8, 219–230.

- Cachia, R. & Ferrari, A. (2010). *Creativity in schools: A survey of teachers in Europe*. Luxembourg: Publications Office of the European Union.

- Cekić-Jovanović, O., Ristanović, D. i Banđur, V. (2014). Obrazovno-računarski softver u funkciji osavremenjivanja kurikuluma prirode i društva. *Nastava i vaspitanje*, 63 (2), 259–275.

- Dobler, E. (2015). E-Textbooks: A personalized learning experience or a digital distraction. *Journal of Adolesencent & Adult Literacy*, 58 (6), 482–491.

- Falloon, G. (2020). From digital literacy to digital competence: the teacher digital competency (TDC) framework. *Educational Technology Research and Development*, 68 (1), 2449–2472.

- Ferrari, A. (2012). *Digital Competence in Practice: An Analysis of Frameworks*. Seville: Institute for Prospective Technological Studies, European Commission Joint Research Centre.

- Glušac, D. (2012). *Elektronsko učenje*. Zrenjanin: Tehnički fakultet „Mihajlo Pupin".

- Ghavifekr, S., Kunjappan, T., Ramasamy, L. & Anthony, A. (2016). Teaching and Learning with ICT Tools: Issues and Challenges from Teachers' Perceptions. *Malaysian Online Journal of Educational Technology,* 4 (2), 38–57.

- Grünwald, N., Pffafenberger, K., Melnikova, J. & Zascerinska, J. (2016). A study on digital teaching competence of university teachers from Lithuania & Latvia within the PEESA project. *ANDRAGOGIKA*, 1 (7), 109–123.

- Guzmán-Simón, F., Garcia-Jimenez, E. & Lopez-Cobo, I. (2017). Undergraduate Students' Perspectives on Digital Competence and Academic Literacy in a Spanish University. *Computers in Human Behavior*, 74, 196–204.

- Hans, V. B. & Crasta, S. J. (2019). Digitalization in the 21st Century – Impact on Learning and Doing. *Journal of Global Economy*, 15 (1), 12-24.

- Hilčenko, S. (2007). Obrazovni softver namijenjen učenicima i učiteljima u prva četiri razreda osnovne škole. *Informatologia*, 40 (4), 327–333.

- Hinostroza, J. & Mellar, H. (2001). Pedagogy embedded in educational software design: report of a case study. *Computers & Education*, 37 (1), 27–40.

- Jancheski, M. (2017). Improving Teaching & Learning Computer Programming in Schools through Educational Software. *Olympiads in Informatics*, 11 (1), 55–75.

- Jašić, S., Kartal, V. i Kostić, Z. (2010). Didaktičke inovacije u trećem milenijumu. U: *Tehnika i informatika u obrazovanju* (207–212). Čačak: Tehnički fakultet.
- Karuović, D. (2012). *Projektovanje obrazovnog softvera 2*. Zrenjanin: Tehnički fakultet „Mihajlo Pupin“.
- Koscianski, A. & Zanotto, D. (2014). A Design Model for Educational Multimedia Software. *Creative Education*, 5 (23), 2003–2016.
- Kostić Kovačević, I., Lukač, D., Gavrilović, J. i Đurović, D. (2014). Obrazovni alati u nastavi matematike. U: *Sinteza* 2014 (340–344). Beograd: Univerzitet Singidunum.
- Krumsvik, R., Øfstegaard, M. & Eikeland, O. J. (2016). Upper Secondary Shool Teacher's Digital Competence: Analyzed by Demographic, Personal and Professional Characteristics. *Nordic Journal of Digital Literacy*, 11 (3), 143–164.
- Krželj, K., Polovina, N. (2019). Značaj ključnih kompetencija iz perspektive nastavnika stranih jezika. *Andragoške studije*, 26 (1), 111–134.
- Lyras, D., Panagiotakopoulos, T. & Kotinas, I. (2014). Educational software evaluation: A study from an educational data mining perspective. *The International Journal of Multimedia & Its Applications*, 6 (3), 1–20.
- Mandić, D. (2010). *Internet tehnologije*. Beograd: Čigoja štampa.
- Mandić, D., Ristić, M. (2006). *Web portali i obrazovanje na daljinu u funkciji podizanja kvaliteta nastave*. Beograd: Mediagraf.
- Metović, E. (2010). Uticaj primene savremenih nastavnih sredstava na povećanje efikasnosti nastave u osnovnoj školi. *Zbornik studentskih radova Fakulteta tehničkih nauka u Čačku*, 1, 1–19.
- Mihaljišin, M. (2007). *Komunikacije u savremenom društvu*. Banja Luka: Sveznadar.
- Moraru, S., Stoica, I. & Popescu, F. (2011). Educational software applied in teaching and assessing physics in high school. *Romanian Reports in Physics*, 63 (2), 577–586.
- Nadrljanski, Đ., Soleša, D. (2002). *Informatika u obrazovanju*. Novi Sad: Učiteljski fakultet.
- Nadrljanski, Đ. (2000). *Obrazovni softver – hipermedijalni sistemi*. Zrenjanin: Tehnički fakultet „Mihajlo Pupin“.
- Nadrljanski, Đ., Nadrljanski, M. (2008). *Digitalni mediji – obrazovni softver*. Sombor: Pedagoški fakultet u Somboru.
- Niederhauser, D. S. & Stoddart, T. (2001). Teachers' instructional perspectives and use of educational software. *Teaching and Teacher Education*, 17 (1), 15–31.
- *Okvir digitalnih kompetencija – Nastavnik za digitalno doba* (2019). Ministarstvo prosvete, nauke i tehnološkog razvoja.
- *Okvir digitalnih kompetencija – Nastavnik za digitalno doba* (2017). Ministarstvo prosvete, nauke i tehnološkog razvoja.
- Perrotta, C. (2013). Do school-level factors influence the educational benefits of digital technology? A critical analysis of teachers' perceptions. *British Journal of Educational Technology*, 44 (2), 314–327.

- Petrović, M. (2016). *Model e-učenja za podršku razvoju informatičkih kompetencija zaposlenih u obrazovanju*. Novi Sad: Prirodno-matematički fakultet.
- Prušević-Sadović, F. (2016). Neophodnost proširenja trofaktorskog sistema nastave u višefaktorski. *Inovacije u nastavi*, 29 (3), 100–107.
- Putnik, Z. (2013). *Prilozi razvoju elektronskog učenja – mogućnost konverzije nastavnih aktivnosti i materijala u elektronski oblik*. Novi Sad: Prirodno-matematički fakultet.
- Radivojević, D. (2016). Obrazovni računarski softver u nastavi prirode i društva. *Bijeljinski metodički časopis*, 3 (3), 24–30.
- Radosav, D., Marušić, T. (2006). Vrednovanje multimedijalnog obrazovno- računarskog softvera. *INFOTEH-JAHORINA*, 5 (1), 339–342.
- Ratheeswari, K. (2018). Information Communication Technology in Education. *Journal of Applied and Advanced Research*, 3 (1), 45–47.
- Redecker, C. (2017). *European Framework for the Digital Competenceof Educators*. Luxembourg: Publications Office of the European Union.
- Savić, T. (2015). *Obrazovni softveri u nastavi Informatike i računarstva u osnovnoj školi*. Integrisane akademske studije Tehnika i informatika. Čačak: Fakultet teničkih nauka.
- Squires, D. & Preece, J. (1999). Predicting quality in educational software: Evaluating for learning, usability and the synergy between them. *Interacting with Computers*, 11 (5), 467–483.
- Stanisavljević-Petrović, Z., Stankovic, Z. & Jevtić, B. (2015). Implementation of Educational Software in Classrooms – Pupils' Perspective. *Procedia-Social and Behavioral Sciences*, 186, 549–559.
- Stanisavljević-Petrović, Z., Pavlović, D. (2017). *Novi mediji u ranom obrazovanju*. Niš: Filozofoski fakultet u Nišu.
- Stanković, Z. (2020). Indivudualizacija nastave primenom obrazovnog softvera. *Teme*, 44 (2), 301–317.
- Stanković, D., Stanković, A. (2012). Priprema interaktivnog softvera za nastavu. *Učitelj*, 79 (1), 54–58.
- Stanković, D. (2009). Interaktivni elektronski izvori informacija u funkciji podizanja kvaliteta nastave prirode i društva. *Inovacije u nastavi*, 22 (3), 51–61.
- Svensson, M. & Baelo, R. (2015). Teacher students' perceptions of their digital competence. *Procedia-Social and Behavioral Sciences*, 180, 1527–1534.
- Zaldívar-Colado, A., Alvarado-Vázquez, R. I. & Rubio-Patrón, D. E. (2017). Evaluation of using mathematics educational software for the learning of first-year primary school students. *Education sciences*, 7 (4), 311–324.